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STRATEGIC RAW MATERIALS IN EAST AND WEST.

9. The Steel Alloy Metals.

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In March, 1955, a survey, "Trends in Raw Material Production in the USSR and the Military Significance of Recent Changes", was issued.

The survey contained information on the production of a number of primary strategic raw materials in Russia. In its preface was announced the issue of a series of separate reports dealing with strategic raw materials which seem of particular significance in evaluating the balance of strength between East and West.

The report on the steel alloying metals, which is the ninth and last in the series, consists of an introduction followed by separate surveys of the following metals: Manganese, nickel, chromium, molybdenum, cobalt, wolframite, vanadium and niobium. The report closes with a summary.

The plan is to issue the surveys separately, so that the introduction and the manganese survey are to appear first, followed by the other surveys, niobium and the summary bringing up the rear.

The introduction and the survey on manganese will be accompanied by a file in which all the issues as they appear may be inserted and kept.

In this report, as in those preceding it, the aim has been to review especially the supply situation inside the Soviet Bloc. The inadequacy of information available, however, has prevented the full achievement of this aim. In order to give an impression of the size and significance of production, and of the balance of strength between East and West the surveys open with a few paragraphs on the importance and uses of the raw materials in general and the size and distribution of production in the West.

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STRATEGIC RAW MATERIALS IN EAST AND WEST.

9. The Steel Alloy Metals.

INTRODUCTION.

The alloying metals considered in this report, viz. manganese, nickel, chromium, molybdenum, wolframite, cobalt, vanadium, and niobium are often referred to as the steel alloy metals because their chief application is in steel and iron alloys.

A report on the steel alloy metals might have included titanium and boron. When this has not been done the reason is that titanium has a future rather as an independent construction metal than as an alloying constituent. As regards boron many of its chief applications are within the iron and steel industry.

On the other hand, manganese, which holds a place apart among the steel alloy metals, might have been left out. It is true that the great part of manganese consumption is accounted for by the iron and steel industry but its principal application is in the smelting of the iron ore where manganese functions as a de-oxidizing and de-sulphurizing agent. Its use as an alloy metal is, everything considered, of secondary importance.

At the beginning of this century the steel alloy metals, nickel excepted, were not much more than laboratory curiosities. Not until the middle Twenties were they used in quantities of any account, it then being the time when the car industry stimulated the development of new hardwearing alloys suitable for mass production. In the Thirties a great many alloys were made having properties such as resistance to corrosion and heat. In this way new applications arose within the transport, machine, foodstuff, shipping and construction industries and in the chemical and electric industries.

World War II substantially increased the use of steel alloy metals. This trend has continued with almost unabated strength to this day.

Alloyed with steel and iron alone or in various combinations with other metals and in varying quantities, these metals produce changes in the physical and chemical properties of steel, which becomes tougher, harder and more durable. The corrosion and heat resistance is increased.

The alloys thus produced have many uses indispensable for modern society: Stainless steel, tool steel, construction steel etc.

Up to one tenth of steel industri production has in recent years been accounted for by alloy steel, on which modern industry in its entirety is based to-day.

The steel alloy metals can also be combined in alloys with one another and with other metals.

Nickel, wolframite and, to a less extent, molybdenum are used in the pure state.

Chromium and nickel are used for coating on other metals (nickel and chromium plating).

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Vanadium, nickel, chromium and molybdenum are used in chemical compounds and catalysts. Chromium is used combined with other materials for fireproof coatings in melting furnaces. Molybdenum is used in the chemical industry, wolframite for glow-lamp filaments and other electrical installations, cobalt in the production of enamel, glass, linoleum, ink and dyes. Vanadium salts are used in coloured glass and earthenware, wolframite in making carbide for armour-piercing shells.

All the alloy metals play an important part in armament production.

In many of the above-mentioned applications the alloy metals and their compounds are indispensable.

TABLE 1.

Applications of Alloy Metals in the United States Industry in 195o.

The Development of Consumption Calculated for the Years up to 1975.

	In alloys ferro or non-ferro	In alloys ferro	In alloys non-ferro	Chemical compounds	Other uses	Total	Calculated per cent. increase up to 1975
Chromium	5o			36	14	loo	loo
Nickel		43	33	5	18	loo	loo
Molybdenum	9o			lo	o	loo	17o
Cobalt		33	33	25	o	loo	34o
Wolframite	63			o	37	loo	15o
Vanadium		99	1	o	o	loo	...
Niobium		99	1	o	o	loo	...

The calculations have been made by the Paley Commission.

In the next quarter of a century alloy metal production will probably rise faster than the production of coal steel. The demand for the various alloy metals will be doubled or trebled - provided that steel production shows the calculated 5o per cent. increase. Other uses of the metals are expected to rise at a similar rate. Nickel and molybdenum will probably in an increasing degree be alloyed with cast iron. Molybdenum as an independent metal may be used as a substitute for scarcer metals. The demand for wolframite and cobalt which is increased through the needs of the armament industry may easily mount to respectively 1½ and 3 times the present consumption. The possibilities for satisfying this demand are even in peaceful political conditions not equally good in the case of all these metals, and in wartime there will be more or less of a shortage of wolframite, cobalt, niobium, chromium

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and manganese in the western world. On the one hand consumption will rise steeply, on the other it must be taken into account that part of the present sources of supply will be lost or damaged through enemy action. Finally heavy losses on the many long and vulnerable transport routes must be counted upon.

Measures must therefore be taken already in peacetime to prevent or minimize the main difficulties.

Such measures include the building up of strategic stocks, investments in the production apparatus, technological research to find usable substitutes for the most critical metals and consumption cuts in the case of the others. By long-term agreements the producers must be given confidence in the market and in the metallurgical works metal waste must be limited to a minimum.

Such measures have in fact to a wide extent been taken already. In the United States and Great Britain at least, strategic stocks have been built up for many years. The United States spends large amounts every year on investments in deposits in underdeveloped areas. The technical research regarding the possibilities of the various metals is undertaken both by the states involved and by the large production companies.

In so far as it is possible, these problems too will be descussed in dealing with the metals separately.

In connection with the steel alloy report a map has been drawn showing ore deposits.

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STRATEGIC RAW MATERIALS IN EAST AND WEST.

9. The Steel Alloy Metals.

a. Manganese.

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CONTENTS.

MANGANESE.

1. Properties and Uses.

1.1. Properties.

Manganese in the pure state is a greyish white metal not unlike cast iron. It ranks as twelfth in abundance among the elements, but is often found in compounds from which it cannot be recovered with any profit.

The melting point of manganese is 1260° C and the specific gravity 8.

Manganese is the principal steel alloy metal and quite indispensable in steel and iron production. More manganese is used there than any other mineral excepting iron and coal. In steel production manganese neutralizes the sulphur and phosphorus content of the iron ore and some of the manganese combines directly with iron and coal and gives to finished steel some of its useful properties such as hardness and durability.

As an alloy metal manganese may be replaced by various other alloy metals. But no substitute is known for manganese in crude iron and steel production itself.

1.2. Uses.

C. 8o per cent. of all manganese is used in the iron and steel industry in the form of ferro-manganese (manganese content: c. 8o per cent.) or as spiegeleisen (manganese content: c. 2o per cent.). 1o-15 per cent. of world production is used in other metallurgical compounds, the remaining 5-1o per cent. in the chemical industry.

Ferromanganese is the form of which 85-95 per cent. of the manganese consumption of the steel industry consists. Ferromanganese contains, besides manganese, iron and coal. Manganese is used as a de-oxidizing and de-sulphurizing agent in the smelting process in which part of the manganese binds the oxygen and sulphur of the iron ore in the slag, the remainder combines with the steel which becomes tougher and more resistant to corrusion. The manganese added reduces the steel's heat and electricity conductivity.

Manganese is used in a ratio of 1 to 1o to the steel produced.

The use of spiegeleisen has been lessening in importance.

Steel, which contains 1 per cent. of manganese, is used in building and for rails. For tools and similar objects which require a particularly high degree of wearing quality and strength steel with a 12 per cent. manganese content is used.

Small quantities of manganese are used in alloys with other metals e.g. bronze and aluminium, whose toughness and corrosion resistance it enhances.

5-1o per cent. of world production is used in the chemical industry. Only high-grade manganese ores are usable there. Manganese is used as a colouring material in enamels, paints and varnish. In the above-mentioned products and also in ink manganese compounds promotes drying.

Manganese ores with at least 75 per cent of MnO_2 are used in the production of dry batteries. Various manganese salts are employed in the photographic industry and for disinfection and bleaching.

Manganese sulphate is used as fertilizer in limestone soils.

2. The Production Process.

Manganese does not occur in nature in the pure state but combined with various other minerals. A manganese ore proper must contain at least 30 per cent. of manganese and preference is given to ores with a manganese content of more than 45 per cent.

First the ore is crushed to a suitable size of grain. In case it does not contain the desired manganese percentage it undergoes a concentration process before the real treatment, which includes roasting, washing and electrolysis, may begin.

3. Ore Deposits.

Manganese occurs in 103 different minerals of which only 7 are thought to be commonly occuring. The most important one is pyrolusite with a manganese content of 63 per cent. Other exploitable manganese compounds are psilomelane, manganite, braunite, rhodoerosite and wad (a kind of manganese oxide formed in old swamp areas).

The principal deposits are of residual or sedimentary origin. They are concentrations which have been formed in nature through a dissolution of primary manganese compounds (especially manganese silicates), which are found scantily distributed in many volcanic and metamorphosed mountain formations. By erosion of such formations the resulting manganese oxides are disengaged as lumps, and deposits in the residual clay formed on or near the surface.

On account partly of the great variety of minerals of which manganese forms a part, partly the varying manganese content in these, it has always been difficult to establish general definitions and a suitable basis for classifications in calculating the manganese reserves.

When the manganese content does not exceed 30 per cent. the ore is not normally referred to as manganese ore but as manganic iron ore. Such ore could technically very well form the basis of manganese production but the process would be too expensive and complicated. It is therefore very important when considering an estimate of manganese reserves in East and West, to pay attention to the per cent. manganese content of the ores.

Inthe United States intensive research it taking place to find out methods which may make the exploitation of low-grade manganese ore easier and cheaper, but up to now no satisfactory solution has been arrived at.

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3.1. Ore Deposits in the Western World.

Africa. A large part of the free-world manganese output comes from Africa, where three areas: Ghana, the Union of South Africa and Morocco together account for 35 per cent. of world production.

Ghana has hitherto been the most steady producer but it is probable that the reserves of that country will be exhausted by 1975 if present production is kept up.

Since the war the greatest production increase has taken place in South Africa. The reserves amount to 5o million tons of ore (45 per cent. manganese content). Renewed geological exploration will probably reveal new deposits.

In Morocco the reserves are also considerable but production is rather less than that of South Africa and Ghana. The newly commenced French Sahara project also includes the exploitation of some of the manganese deposits found in recent years at Colomb Béchar on the border between Morocco and Algeria, so that a certain production increase may be expected from there.

Asia.

The largest manganese reserves outside the USSR are in India. The total reserves here of 45 per cent. ore are estimated to amount to loo millions tons while another 2oo million tons show an average manganese content of 25 per cent. The Indian deposits are situated near Madras and in the Balaghat district in the Central Provinces. Excepting the USSR, Indian is the world's greatest producer of manganese ore. Since 1945 there has been a steady production increase, steepest, however, in the years 1949-5o-51 under the influence of the Soviet export stop. The greater part of India's production goes to the United States.

South and North America.

Brazil has the largest known deposits on the American continents. The deposits are located in the states of Bahia, Minas Geraes and the Matto Grosso. In the Matto Grosso in the Urucum deposits near Corumba there are high-grade ores which are estimated at 3o million tons. These ores contain 45-47 per cent. of manganese and 7-11 per cent. of iron. Considerable capital investments are necessary if large-scale production is to be started.

The world's greatest steel producer, the United States, has some manganese reserves but they are economically unprofitable as they consist partly of large deposits with an insignificant manganese content or of small deposits with a high manganese content. Neither type of deposit lends itself easily to economic exploitation.

The American reserves measured comprise 8oo million tons of ore with a manganese content of 31 million tons corresponding to an average content of 3-4 per cent. Reserves estimated amount to 3 billion tons of ore with a manganese content of 63 million tons corresponding to an average of 2 per cent.

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More than 98 per cent. of American manganese is found in 12 large low-grade deposits, the rest in 1ooo small deposits spread throughout

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22 states. The principal low-percentage deposits are the following: Chamberlain in South Dakota, Cuyuna in Minnesota, Aroostok County in Maine and Artillery Peak in Arizona.

To-day American reserves of high-grade ores (48 per cent. of Mn) amount to less than 2oo.ooo tons which, if exploited at once, would not suffice to meet two months' consumption.

Ore reserves with a manganese content of 15 per cent. (on an average 17-18 per cent.) amount to c. 2o million tons. This ore will, at the present consumption rate, be enough to meet the demand for the next 4 years.

Others.

Manganese is also found in varying quantities and with varying manganese contents in the Belgian Congo, Cuba, Indonesia, the Philippines, Turkey, Italy, Mexico, the Sudan, Sweden, Egypt, Portugal and Israel.

Table 1 shows Free World Reserves.

TABLE 1.

Free World Manganese Reserves.

(million tons)

	Average: 45 per cent. of Mn	Average: 25 per cent. of Mn
India	1oo	2oo
South Africa	5o	...
Morocco	3o	2o
Belgian Congo	1o	2o
Ghana	1o	2o
Brazil	5o	...
Cuba	o.4	o.8
Other Areas	16 a)	27 b)

a) Indonesia, the Philippines, Turkey, Italy, Mexico and Sweden.

b) Egypt, Portugal, the Philippines, Mexico, Israel and Italy.

The Table is from the Paley Report.

3.2. In the Soviet Bloc.

The world's largest manganese reserves are in the USSR. Thus Pravda maintains that the country has 88 per cent. of the world's known reserves. In 1938 the Russian reserves amounted to 786 million tons. Even when taking into account the USSR's own, disproportionately large consumption it is the general belief that the known reserves will be sufficient to meet the demand for the next 15o-2oo years.

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More than 9o per cent. of the Soviet ore reserve is located in the two large deposits of Chiatura in the Transcaucasus and Nikopol in the Ukraine.

The Chiatura deposit is situated on the Kviviny river in Georgia within an area c. 3o kilometres long and 8 to 1o wide. The ore is washed locally and is then sorted into 4 grades according to the manganese content which ranges from 25 to 59 per cent. The production of ferromanganese requires manganese ore with a low iron content, a fact which renders the Chiatura ore suitable for ferromanganese production. The Chiatura ore, however, has a large silicon and phosphorus content. The presence of silicon makes the ore powdery and results in loss in the smelting process. A high phosphorus content is even more harmful because phosphorus combines with the molten crude iron which thus becomes brittle and less usable. Nevertheless the Chiatura ore, in the periods during which it was exported, has been quite able to compete in the world market.

In the course of the 4th Five-year Plan production has been fully mechanized, from the extraction in the mines through washing and concentration to the shipping in railway trucks.

Chiatura is the USSR's principal manganese producer. The reserves are shown in Table 2.

The Nikopol deposit is on the right bank of the Dnjepr. It includes two mining areas situated 15-2o kilometres apart. The manganese strata lie horizontally at depths of 12-23o feet. The crude ore contains only 28 to 3o per cent. of manganese, while the silicon content comes up to 42 per cent. Consequently all ore from here must undergo a concentration process in which the silicon is washed out and the manganese content increased to 5o per cent. The concentrated Nikopol ore, like the Chiatura ore, has an iron-manganese ratio (1:1o) suitable for ferromanganese production. The Nikopol ore is even more phosphoriferous and powdery than that of Chiatura but none the less all ferromanganese used in the USSR up to World War II was produced exclusively from Nikopol ores, the best ores being reserved for export.

During the war Nikopol fell into the hands of the Germans. In 1943, before their retreat, mines and plants were destroyed. Already in 1945, however, production was 3oo.ooo tons and since then it has been increased substantially every year, at least up to 1951.

Nikopol is second in importance among the manganese producers of the USSR. Table 2 shows the reserves.

Other important manganese deposits in the USSR are: In Turkestan: Dzhezdy and Kara Dzhali. In the Urals: Polunochnoye, Marsyaty, Abzelilova or Boloutsk, Ulu-Telyak, Uchaly and Baimak. West Siberia: Usinskoye. East Siberia: Mazuskoye near Achinsk in Krasnoyarsk Krai.

There are various types of manganese ore in the Urals. The greater part of the deposits have not been thoroughly explored by geologists because the other Russian deposits are easily able to satisfy the demand.

The Uralsk manganese ores contain 2o-3o per cent. of manganese and a similar content of iron. After concentration they are suitable for the production of ferromanganese.

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TABLE 2.

Manganese Reserves of the USSR.
(million tons)

	A+B+C	A+B	average per cent. manganese content
Ukraine	400.8	90.5	30
Transcaucasus (Chiatura)	162.5	112.1	50
Urals	18.1	12.3	10-30
Bashkiria	5.3	0.6	10-35
Kazakhstan	33.5	...	40-50
West Siberia	1.0	1.0	...
North Caucasus	33.9	...	...
Total	655.1	216.5	

A = Deposits explored and being or ready to be exploited.

B = Known deposits.

C = Probable deposits.

The Table is from P. B. Shimkin: Minerals, a Key to Soviet Power.

Recent Discoveries.

[redacted] a manganese deposit was discovered a few years ago on the Tobol river in Saribai Rayon. It was said to be the world's largest. 25X1

3.3. In the Satellite States.

In Hungary manganese ore is extracted at Urkut and Epleny. The former deposit is the more significant. The size of the reserves is not known. Manganese ore is also extracted in Bulgaria, Czechoslovakia, Rumania and Yugoslavia.

4. Production.

4.1. Production in the Western World.

Table 3 shows production in principal western countries.

TABLE 3.

Manganese Ore Production in the Free World.

(Manganese content in 1000 tons)

	1939	1945	1947	1949	1951	1953	1955
India	429	103	215	310	611	897	720
Ghana	178	371	311	385	425	393	260
South Africa	175	47	121	275	318	332	220
Morocco	25	15	42	98	151	166	168
Belgian Congo	4	...	4	6	35	108	230
Cuba	50	101	23	28	70	163	144
Brazil	123	119	81	101	89	101	85
Free world production total a)	1.160	1.000	1.000	1.420	2.120	2.830	2.500

a) = In the total is included a number of minor producers in the free world and also certain Communist producers, not including the USSR. The Table is from the UN Statistical Yearbook.

India is, as is shown in the Table, the greatest free world manganese producer. Production has, in the postwar years, been rising steadily. The rise was at its highest in the years 1949-50-51 under the influence of the gradual Russian export stop. The Indian manganese reserves are large and a continued production increase should be possible provided that political conditions present no hindrances.

Production is considerable also in the African deposits. Although it is perhaps to be expected that the fall in production which has occurred in Ghana may continue owing to dwindling reserves, new producers have made their appearance, such as the Belgian Congo and Morocco.

In nearly all free World producer countries a considerable expansion took place in 1950 in consequence of increasing demand after the outbreak of the Korean War and the Russian export stop which was a counter move against the American embargo.

However, the threat of a resumption of Russian manganese export has had a damping effect on investments stimulating production in free world manganese works and mines.

4.2. Production in the Soviet Bloc.

Table 4 shows manganese ore production in the Soviet Bloc.

TABLE 4.

Soviet Bloc Manganese Ore Production.

(1000 tons)

	1945	1950	1953	1954	1955	1956	1960 (plan)
USSR	1.470	3.600	4.600	4.600	4.700	...	...
Rumania	...	93	...	...	390	...	546
Hungary	3	44	...	121	276	...	...
Czechoslovakia	30	168	...	240	250	...	...
Bulgaria	...	11	...	32	62	76	...
Yugoslavia	0.6	13	10	9	10	11	...

The USSR is the world's greatest manganese producer with an estimated annual production of somewhere between 4 and 5 million tons of ore, or more than 40 per cent. of world production.

Until World War II the USSR was the world's principal manganese exporter. This was no longer the case when the Germans captured Nikopol thus causing production to fall considerably. After the war the USSR resumed its export though to a limited extent, and 1950 it came to a stop by way of a counter move against American export restrictions on strategic raw materials from the USSR.

Although the Satellite countries have a netto deficit of 200-300.000 tons of manganese ore annually, these is a not inconsiderable production in several of these countries (see Table 4). Already prior to the war Hungary, Czechoslovakia and Rumania would show substantial production in several periods. In 1943 Hungary's production of manganese ore reached 112.000 tons and Rumania's 37.000 tons. Since the war production has been further increased.

Various circumstances would seem to suggest that the satellite ores have a low manganese content and that they must undergo a concentration process.

5. Supply Problems.

5.1. Problems of the West.

Manganese comsumption being so intimately connected with iron and steel production (90 per cent. of manganese consumption is in one way or another accounted for by the iron and steel industry), a good impression of manganese consumption may be had by considering this production in

the various countries. It is true that certain differences obtain from country to country. Thus the amount of manganese used per unit of produced iron or steel varies. Such differences are determined, for on thing, by the manganese content of the iron ore itself and also by the sulphur content of the coal used for smelting. Other factors also show a marked effect on manganese consumption. Thus a country with plentiful manganese supplies (e.g. the USSR) will use larger quantities of manganese in its steel alloys than countries poor in manganese (e.g. the United States).

Among the world's principal manganese consumers only the USSR and the British Commonwealth are self-sufficient (both with tonnage available for export). China has sufficient resources for domestic consumption. Japan and Italy are not quite able to meet home demand. The United States, France, Belgium, Germany, Spain and the Netherlands are almost entirely dependent on supplies from abroad. The latter countries, together with the United Kingdom, account for 75 per cent. of world manganese consumption.

The use of manganese in steel production is technically determined. In the United States the requirement is 13 lbs of manganese per ton of produced steel. A very considerable proportion of manganese consumption is in the form of ferromanganese.

In making ferromanganese about 16 per cent. of the manganese participating in the process, half of the slag, and half of the gases resulting are lost.

No method for economically retrieving the lost manganese has been found as yet. In the western world an energetic effort is being made to solve this problems and thus bring a not insignificant relief to the supply situation.

Under present circumstances manganese consumption is expected to increase in step with steel production. The PALEY COMMISSION has, on the basis of the situation in 1950, carried out a calculation of manganese consumption in the United States and the rest of the free world in 1975.

The result arrived at was that manganese consumption in both the United States and other free countries would increase by 60 per cent. till 1975. In the United States consumption would mount to 2.7 million tons of ore of the 46 per cent. grade (in 1950, 1,75 million tons), the iron and steel industry accounting for 2.5 million tons and other applications for 200.000 tons.

Total consumption of the rest of the free world was estimated at 2.3 million tons, of which 2.1 million tons would find use in the iron and steel industry.

In 1975 free world demand for 46 per cent. manganese ore should thus amount to c. 5 million tons. It is hard to say whether these figures will hold good. The most recent development in the world economy seems to point to a temporary production decrease or at least stagnation in the steel industry. The opposite effect, however, may be produced by the intensified research and construction activities in the guided missile and nuclear industries.

There are good possibilities for increasing manganese production. An expansion of this production is less difficult and expensive than in the case of most other metals. Manganese ores often occur on or near the surface of the earth thus facilitating open cast mining. Further, the ore extracted may be concentrated without any complicated or expensive processing. Often a washing will suffice. Under present circumstances free world manganese production may be increased by c. 4 million tons annually. Expansion to a full 5 million tons, which demand in 1975 is estimated to require, is only feasible if large new mining projects are begun.

It seems evident that, under peaceful conditions, the manganese supplies of the free world are secure. The reserves are plentiful and difficulties arising from their exploitation are not insurmountable.

In wartime, however, the position will not be so easy. The United States, the free world's greatest steel producer, might then easily be cut off from its overseas supplies, which to-day cover 9o per cent. of the country's consumption - the United imports more than 1.5 million tons annually mainly from India and Africa. In time of war the maintenance of these supplies will present a major problem.

More or less the same difficulties prevail as far as Europe is concerned. It is thereforenecessary already in peacetime to work out a programme which may counter these difficulties without molesting present trade connections and without shifting to the use of more costly ores.

Such a programme must of course include strategic stockpiling. This measure, however, will hardly suffice in itself and is designed only to contribute towards overcoming the difficulties in a situation of transition. It will thereforesoon be necessary to turn to the extraction of domestic low-grade ore reserves.

To this comes the possibility of recovering manganese from waste products (slag). Also a more economical use of manganese may help to solve the problem. A reduction of the manganese content in most steels may lower consumption by lo per cent. without essentially deterioating the quality of the steel. A reduction of manganese consumption would also be feasible through the use of less sulphuriferous iron ores. Finally, if the manganese loss in ferromanganese production is successfully eliminated, savings of up to lo per cent. will be possible.

5.2. Problems of the Soviet Bloc.

The USSR is the world's leading producer of manganese ore and, probably, the greatest consumer also. The resources may almost be referred to as "unlimited" - to use an epithet frequent in Soviet usage. Pravda has asserted that 8o per cent. of the world's manganese reserves are within the Soviet borders. Whether this is true is difficult to say, but one thing is certain: that neither the bulk of the reserves, nor their quality or location, nor the size of ore production present any major problems.

Before World War II the USSR was chief among the world's manganese ore exporters. The export was distributed thus: United States 28 per cent., France 17 per cent., Germany 12 per cent., Belgium and Luxemburg 7 per

cent., Poland 5 per cent., and others 31 per cent. Import from the USSR was particularly important for the United States and Poland and made up respectively 63 and 40 per cent. of the total manganese import of those countries. During the war the manganese import from Russia came to an almost complete stop, but was resumed in a limited degree in 1945. In 1950, what was probably a politically motivated export stop took place - a counter move against the American embargo.

Table 5 shows Russian production and export of concentrated manganese ore.

TABLE 5.

USSR's Production and Export of Concentrated Manganese Ores.

Year	Production	Export	Consumption
1925-28 (total)	3.885	2.525	
1929	1.415	1.037	
1930	1.328	767	
1931	884	742	
1932	832	416	
1933	1.021	655	
1934	1.821	737	
1935	2.384	645	
1936	3.002	606	
1937	2.752	1.001	
1945	1.470	171	1.299
1946	2.040	286	1.754
1947	2.400	400	2.000
1948	2.777	416	2.300 (estimate)
1949	3.200	40	3.000 "
1950	3.690	---	3.500 "

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From the Table it appears that manganese production, contrary to what is normally the rule in the USSR, has, in the prewar years, to a certain extent been subject to the general economic laws influenced by the fluctuating western demand.

There are signs that the future may bring a cancellation or at least a slackening of the Soviet ban on manganese ore export to the West. The new trade agreement between the USSR and Sweden for the year 1958 includes, inter alia, Soviet deliveries of 20.000 tons of manganese ore, and an agreement made between the USSR and Italy for the period Jan. 1, 1958, to Dec. 12, 1961, also includes Soviet deliveries of manganese ore.

25X1

Although several of the satellite countries produce their own manganese ore there is a netto deficiency in these countries of 2oo.ooo tons annually. East Germany thus imported 73.ooo tons of manganese in 1956, while the plans for 1957 envisage imports of 82.ooo tons, 2o.ooo tons of which were imported in the course of the first three quarters. A large part of the manganese import to the satellite countries originates in the USSR but manganese deliveries from free countries are also received by the satellites. Thus India, in accordance with agreements made in 1955, has supplied manganese ore for East Germany, Bulgaria and Poland. This import from abroad should probably rather be viewed in the light of transport difficulties than as a sign of manganese ore deficiencies in the Soviet Bloc.

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